MIS® | Regenerative Solutions

Optimal volumes and quality of hard and soft tissue are required to satisfy the goals of oral rehabilitation and implant dentistry. MIS offers a range of regenerative materials for dental use aimed at providing solutions for a wide variety of clinical needs. MIS regenerative products are available in varying volumes and sizes for simple and easy delivery directly to the surgical site. High quality engineering and manufacturing processes ensure safety of all MIS products. The selection of regenerative solutions offered by MIS allows clinicians to choose the precise products necessary to obtain the optimal surgical outcome.

TABLE OF CONTENTS

P. 6 - 11 **4MATRIX+** BONE GRAFT PUTTY

P. 12 - 17 **BONDBONE®** BONE GRAFT CEMENT

P. 18 - 23 **4BONE™ BCH** BONE GRAFT PARTICULATE

P. 24 - 29 **4BONE™ RCM** RESORBABLE COLLAGEN MEMBRANE

REGENERATIVE SOLUTIONS

4MATRIX+ • BONDBONE • 4BONE BCH • 4BONE RCM

4MATRIX+

Bone Graft Putty

4MATRIX+ is a revolutionary & innovative synthetic, bone graft putty. It is composed of 40% Beta Tricalcium Phosphate (ßTCP), 60% Hydroxyapatite (HA) & Hydrogel, and was developed to simplify dental bone grafting procedures. 4MATRIX+ provides osseous rehabilitation, and is fully replaced by vitalized, architectured bone.

BENEFITS

Simple to Use

- One syringe, one chamber, one action - easy handling
- Ready to use – no premix need

Controlled Resorption

With both a fast and slow resorbing bone material mixture, 4MATRIX+ offers a controlled rate of resorption, which promotes the ideal environment for bone growth.

Out-of-the-box stability

4MATRIX+ requires no mixing, moisturizing or other preparation due to a soluble carrier which enables maintaining the original graft shape and bone volume.

Facilitates Bone Regeneration

4MATRIX+ provides the appropriate environment for bone regeneration, due to a porosity rate of 70%, which enables fast infiltration of blood and growth factors, as well as cellular colonization and proliferation.

Material

60% Hydroxyapatite
40% ßTCP and hydrogel

Resorption Time

While-TCP (40%) resorbs fast, the HA (60%) act as a longer space maintainer. The average resorption rate is expected within 7 months (±2).

Indications

Periodontal / infrabony defects, Ridge augmentation, Extraction sites, Sinus lift, Cystic cavities.

**direct contact of at least 2 surfaces is required.

ORDERING INFORMATION

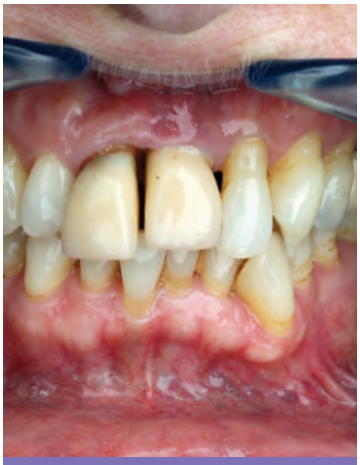
BS-4MXP5 - 4MATRIX+ Bone Graft Putty, 0.5cc
BS-4MXP1 - 4MATRIX+ Bone Graft Putty, 1cc

4MATRIX+ Case Review

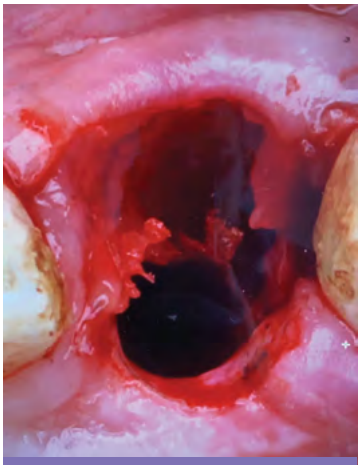
Socket preservation - Extraction socket with large buccal bone defect.

Dr. David Norre, Belgium

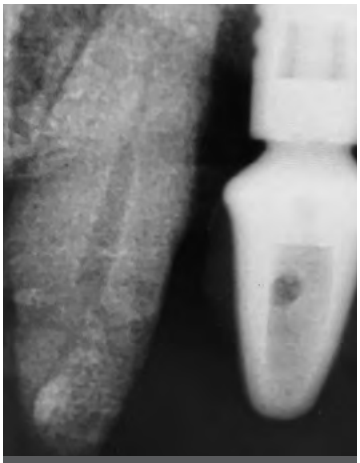
70 year old non-smoker female, presented with severe bone loss in tooth #11. The tooth was extracted and immediate placement was preformed. The implant was placed in conjunction with 4MATRIX+ to correct a buccal bone deficiency. The recommendation is to use a membrane in all surgical procedures. However, due to esthetic reasons, no membrane was used and immediate loading was preformed by using a temporary crown.



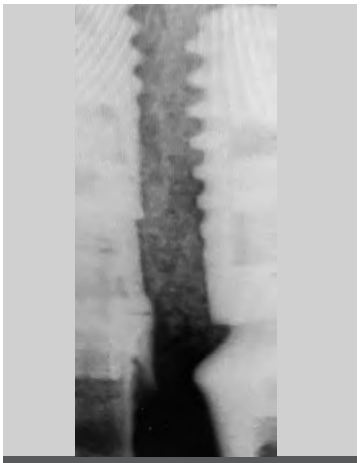
1.Pre-Op



2.Extraction site with large buccal bone loss

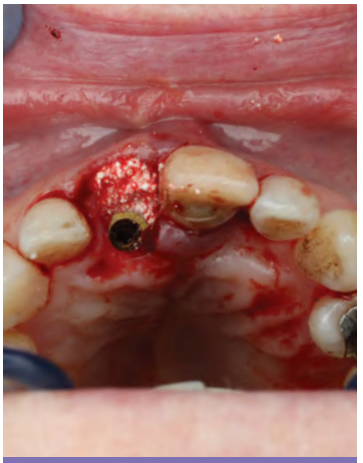


Pre op X-ray

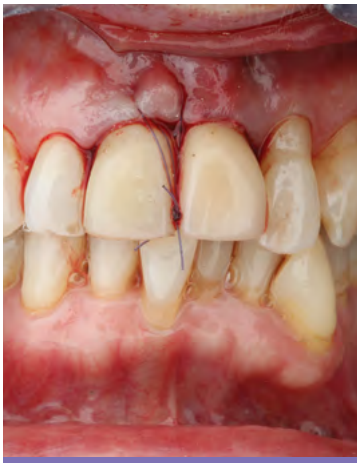


4 months post op X-ray

3.4MATRIX+ injected into the defect



4.Defect filled with 4MATRIX+



5.Day of surgery - after

4MATRIX+

Frequently Asked Questions

What is 4MATRIX+?

4MATRIX+ is 100% synthetic, resorbable bone graft putty. It is composed of 40% Betatricalcium phospate and 60% Hydroxyapatite, with a soluble carrier, which acts as a spacer and binder of the particles. 4MATRIX+ is intended to fill, augment or reconstruct osseous bone defects.

What are the indications for using 4MATRIX+?

4MATRIX+ may be used in maxillofacial applications. Typical uses include, but are not limited to:

- Periodontal / infrabony defects
- Ridge augmentation
- Extraction sites
- Sinus lift
- Cystic cavities

Is 4MATRIX+ resorbable?

Yes. The resorbability of the Hydroxyapatite (HA) is dependent on the process used during production. The process used for the 4MATRIX+ ensures complete resorption of the hydroxyapatite.

What is the resorption rate for 4MATRIX+?

The composition of 4MATRIX+ allows a balanced degradation; while ß- TCP (40%) resorbs fast, the HA (60%) act as a longer space maintainer. The average resorption rate is expected within 7 months (±2).

What are the porosity properties of 4MATRIX+?

4MATRIX+ has fully interconnected porosity with 3 different granule sizes ranging from 80 µm to 1mm. An interconnected network of macropores and micropores enables the colonization of bone cells and biological fluid, uniformly within the matrix.

Is 4MATRIX+ bioactive?

Yes. Bioactivity, by definition, is having an effect upon a living organism, tissue, or cell. 4MATRIX+ promotes the formation of new bone by releasing calcium and phosphate ions into the surrounding area. The tricalcium phosphate dissolution and bone crystal precipitation create a newly bioactive interface with bone cells.

Does 4MATRIX+ have a setting time?

No. 4MATRIX+ is a putty-like bone substitute, not a cement. This non self-setting, moldable material adapts easily to the defect site and allows flexibility during its use.

Can the 4MATRIX+ be used as a composite?

Yes. Due to its properties, 4MATRIX+ may be used with autogenous bone graft.

Should I take any precautions while using this material?

In order to preserve the delicate structure of the material, do not press, jam or compact the putty. Fill the defect without any pressure; do not overfill. It is very important to leave space between the granules to allow for biological infiltration and cellular colonization.

How should I use 4MATRIX+ the first time?

Prior to first use, it is recommended to read the IFU, in order to achieve the desired outcome. The syringe is packed in a double pouch for maximum sterilization. Once the package is opened, remove the black cap of the syringe by twisting it and pulling it out. Pull the piston back approximately half a centimeter. Then push the piston gently, and eject smoothly into the defect. Since the 4MATRIX+ is in putty form, there is no need to hydrate the graft prior to use.

Is it necessary to use a membrane?

To avoid any possibility of leakage out of the cavity of implantation, a bone flap or resorbable membrane can be associated. The defect must not be left open.

BONDBONE®

Bone Graft Cement

BONDBONE is an innovative synthetic bone grafting material, which takes the best qualities of hemihydrate and dihydrate calcium sulfate and combines them into one unique product. Due to its novel engineering process, BONDBONE has excellent handling properties.

BENEFITS

Full resorption

Pure biphasic calcium sulfate mineral cement facilitates predictable resorption time and increases the percentage of vital bone.

Biocompatible

100% pure biphasic calcium sulfate.

Fast Setting

The initial pliable paste is fast setting and is not affected by the presence of blood or saliva.

BONDBONE Composite* Mix with a granular bone filler to:

- Prevent particle migration
- Potentially create an osteoconductive and osteoinductive composite

* BONDBONE Composite should be a blend of:
▪1cc BONDBONE ▪ 0.5cc Bone Particulate ▪ 1cc Sterile Saline

Material

100% Pure Biphasic Calcium Sulfate

Resorption Time

3 Months (Stand Alone)

Indications

Stand Alone: socket grafting and other similar small bony defects

As a Composite: small and larger bone deficiency such as socket grafting ,periodontal defect ,lateral augmentation, sinus lifts.

ORDERING INFORMATION

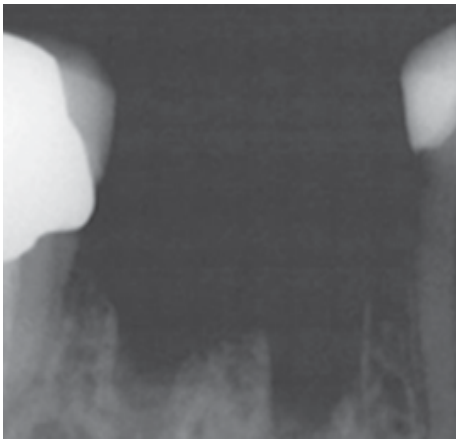
BS-BB005 - BONDBONE 0.5cc, 3 Drivers
BS-BB010 - BONDBONE 1cc, 3 Drivers

BONDBONE®

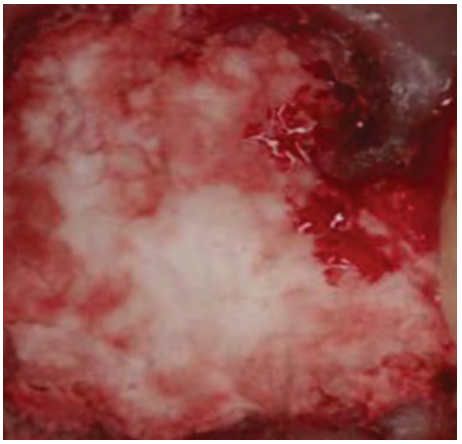
Case Review

Clinical Case:

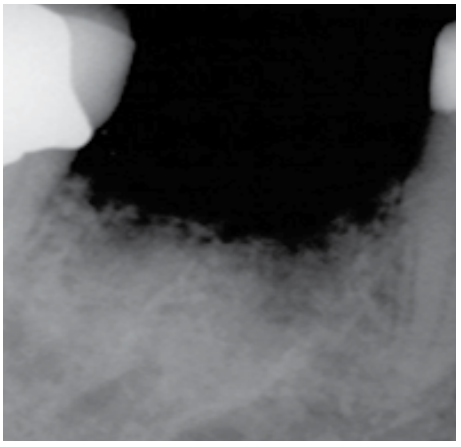
Proven to ossify and fully resorb in 3-4 months

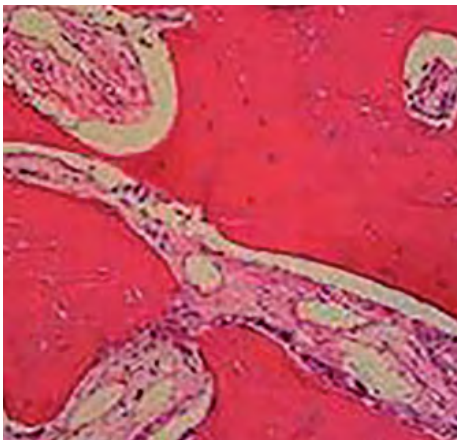


Pre-Op Radiograph



BONDBONE applied and set within 2 minutes



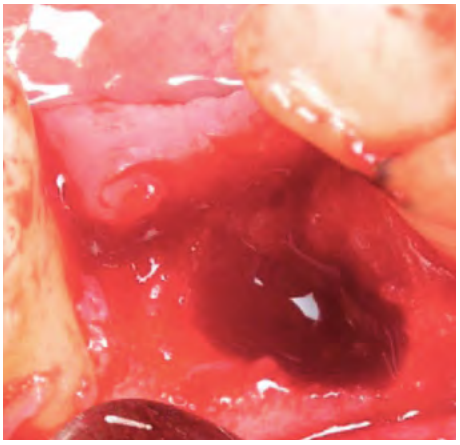


3 months post-op radiographic and histological findings demonstrated complete remodeling with an absence of remaining graft particles

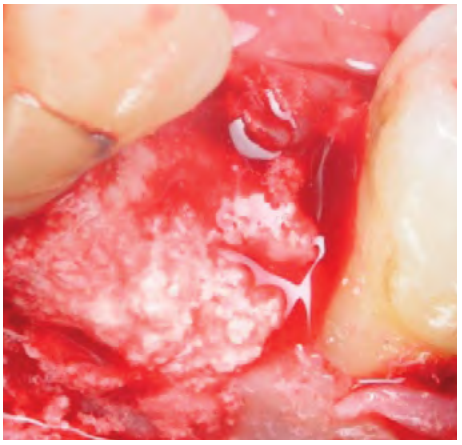
Ziv Mazor, DMD; Michael D. Rohrer, DDS, MS; Hari S. Prasad, BS,MDT; Nick Tovar, PhD; Robert A. Horowitz, DDS.
39-year-old woman with failed mandibular right first molar under a fixed PFM prosthesis

Clinical Case:

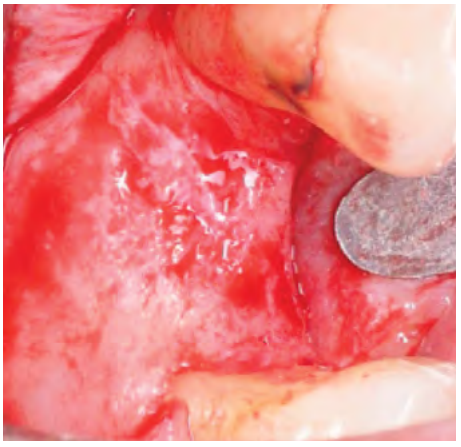
Shows BONDBONE being
used as a stand-alone product.



Bone defect before treatment



BONDBONE® placement



Healing after three months

Photos: Dr. Amos Yahav

BONDBONE®

Frequently Asked Questions

What is BONDBONE?

BONDBONE is a novel synthetic bone graft material considered to be a breakthrough in the field of dental bone grafting, composed of biphasic calcium sulfate.

How can I use BONDBONE?

You can use BONDBONE in two ways: By itself or as a composite graft. By itself, if the defect is not larger than 10 mm and has at least three walls of bony support, BONDBONE may be used. BONDBONE can also be used as a composite graft in more complex cases. The setting reaction begins when the powder is mixed with saline. The site should be slightly overfilled to compensate for the compression and setting process.

What are the main advantages of BONDBONE?

BONDBONE has excellent handling properties: The initial pliable paste hardens in approximately three minutes. Its unique porous structure allows infiltration of growth factors through micropores, as well as angiogenesis and cell proliferation through macropores. BONDBONE significantly reduces procedure time. BONDBONE will act as a binder when combined with the granules of other bone graft materials.

What is the resorption rate of BONDBONE?

BONDBONE has a resorption rate that is comparable to the rate of natural bone growth and will not interfere with the healing process.

Does it contain any additives other than calcium sulfate?

BONDBONE offers high performance with absolutely no elements other than pure calcium sulfate; the well-known advantages of calcium sulfate are maximized for optimal healing. Because of the biphasic structure of BONDBONE, the advantages of both hemihydrate and dihydrate calcium sulfate are realized, without the need for additives.

What is the setting time of BONDBONE?

The setting time of approximately three minutes allows for outstanding handling properties. In addition, it is the only bone graft material that can set in an aqueous environment and in the presence of blood and saliva. The reaction temperature is lower than 30ºC (85ºF) and it has a neutral pH, thus reducing the patient's discomfort during surgery.

Can BONDBONE act as a binding material?

Yes, definitely. Mixing BONDBONE with other granular graft materials (Autografts, Xenografts, Allografts and Alloplasts) creates a cementable composite graft mixture. The clinician may use the desired material to mix with BONDBONE, but it is recommended to choose a long term, space-maintaining material for larger defects that require longer healing time. When used as a binder, a 2:1 ratio of BONDBONE to particulate graft material is recommended.

What will the x-ray show while working with BONDBONE?

During BONDBONE application the x-ray shows a complete radiopaque image identical to the surrounding bone. A week later, a radiolucent image may be shown in the perimeter, and it will expand to the entire area within 3 weeks. This does not indicate the material is resorbed, but it is the osteoid prior to calcification. Within a few weeks, the area will be radiopaque again.

Can BONDBONE be mixed with antibiotics and growth factors?

Yes. BONDBONE is composed of pure calcium sulfate, which can be combined with antibiotics and growth factors.

Can BONDBONE be mixed with blood?

No. Despite the fact BONDBONE sets in the presence of blood and saliva, blood will not activate the material into setting. Because of this, it is always recommended to use sterile saline. Due to the porous structure of BONDBONE, blood will penetrate all layers of the material effectively.

4BONE™ BCH

Bone Graft Particulate

4BONE BCH is a synthetic bone graft material made of Hydroxyapatite and ßTCP. Its osteoconductive structure, featuring 70% interconnected macro-porosity and micro-porosity, promotes colonization of osteogenic cells and allows the diffusion of biological fluids. Combined with its optimized morphology, 4BONE BCH provides flexibility and a predictable healing process for a wide range of bone regeneration procedures.

BENEFITS

Facilitates new bone growth

4Bone BCH provides the appropriate environment for bone regeneration, due to a porosity rate of 70%, which enables fast infiltration of blood and growth factors, as well as cellular colonization and proliferation. In addition, it promotes the formation of new bone by releasing calcium and phosphate ions into the surrounding area.

Osteoconductive

Micro and macro morphology allows cell attachment and proliferation.

Easy to Use

Granules are easily mixed with saline or the patient's own blood. 0.5cc syringe packaging enables direct delivery to the augmented site.

Material

60% Hydroxyapatite (HA) 40% (ß-TCP)

Resorption Time

6-8 Months

Indications

Sinus lift; Ridge augmentation; Socket preservation; Bone void filling.

ORDERING INFORMATION

BS-4BS01 - BCH syringe, 0.5cc, granule size: 0.5-1mm
BS-4BS1S - BCH vial,1cc, granule size: 0.5-1mm
BS-4BS25 - BCH vial, 2.5cc, granule size: 1-2mm

4BONE™ BCH

Bone Graft Particulate

Clinical Implant Dentistry and Related Research, Volume 00, Number 00, 2016

Ridge Preservation Using Composite Alloplasticmaterials: A Randomized Control Clinical And Histological Study In Humans

Yaniv Mayer, DMD;* Hadar Zigdon-Giladi, DMD;† Eli E. Machtei, DMD‡

ABSTRACT

Aim: To evaluate (clinically, histologically, and histo-morphometrically) the use of composite materials (Biphasic calcium sulphate [BCS] with b Tri-Calcium Phosphate (b-TCP) and Hydroxyapatite [HA]) in extraction socket sites and compare it to un-disturbed natural healing.

Material and Methods: Prospective clinical trial of 36 patients (40 extraction sockets) were randomly assigned to either test or control group. Alveolar ridge horizontal dimension was measured in the middle of the socket at crest and 3 and 6mm subcrestally. Crestal vertical height was measured at baseline surgery and at 4 month re-entry, at which time bone core biopsies were harvested from the center of the edentulous ridge. Histo-morphometric evaluation of the samples was performed using hematoxylin & eosin stains and morphometric software.

Conclusion: Ridge preservation technique using a combination of two synthetic bone grafts b-TCP and HA with BCS resulted in greater stability in the horizontal dimension after 4 months.

*Doctor, School of Graduate Dentistry, Department of Periodontics, Rambam Health Care Campus, Haifa, Israel; †Associate Professor, Head of Lab of Bone Regeneration, School of Graduate Dentistry, Department of Periodontics, Rambam Health Care Campus, Haifa, Israel; ‡Professor, Head of the School of Graduate Dentistry, Department of Periodontics, Rambam Health Care Campus, Haifa, Israel

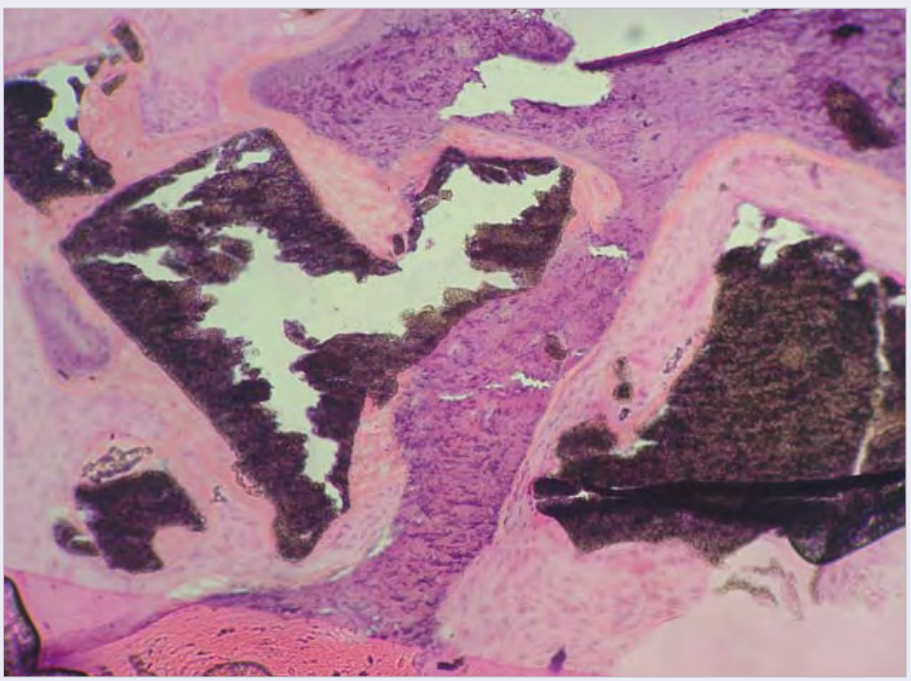


Figure 4 Representative image of test group demonstrating residual scaffold, surrounded by new bone and connective tissue (H&E).

4BONE™ BCH

Frequently Asked Questions

What is 4BONE BCH comprised of?

4BONE BCH is comprised of a 100% synthetic material which is similar to the mineral structure of human bone. The use of hydroxyapatite (HA), which has a slow resorption rate and tricalcium phosphate (TCP), which has a faster resorption rate, guarantees a perfect balance, unique to 4BONE BCH. These characteristics allow 4BONE BCH to be replaced by living bone without a significant loss of volume.

Is 4BONE BCH bioactive?

Yes. 4BONE BCH promotes the formation of new bone by releasing calcium and phosphate ions into the surrounding area. The bioactive process, is based on the dissolution of HA and TCP into bone. At the calcium phosphate (CaP)/bone interface, a dynamic process occurs, which includes crystal/protein interactions, cell and tissue colonization, bone remodeling, and finally a total replacement by a natural functional bone.

How long does it take to replace the 4BONE BCH with bone?

Clinical experience shows that 6 to 8 months are required for the formation of normal bone. The healing process starts with the colonization of the macro-pores and is followed by the differentiation of mesenchymal stem cells into osteoblasts and osteoclasts. However it is important to note that the regeneration speed is affected by the age and medical condition of the patient. The augmentation speed corresponds to the bone physiopathology, bone turn-over and remodeling.

Is 4BONE BCH fully resorbable?

During the process of regeneration, 4BONE BCH is fully replaced by bone. Its global porosity >70% of an optimal surface, allow for direct contact with the natural bone turnover process. The micro-structure, approximately 30% of the global porosity, allows for favorable penetration of biological fluids that carry proteins and other growth factors required for bone tissue in-growth with new vascularization, as well as a highly osteogenic matrix.

Why use hydroxyapatite and not just tricalcium phosphate?

Hydroxyapatite (HA), the closest synthetic equivalent to human bone mineral, is bio-compatible and bioactive in-vivo. Hydroxyapatite may or may not be resorbable. Resorption rate depends on its sintering process of the HA crystals obtained after synthesis. 4BONE BCH hydroxyapatite is resorbable. The residual HA acts as a scaffold for the precipitation of the bony crystals. These newly-formed crystals increase the specific surface area, and integrate with the osteogenic growth factor of the patient.

Should I take any precautions while using this material?

4BONE BCH does not have any initial mechanical properties, so the micro-porous structure must be preserved during handling. Do not press, jam or compact the granules in order to preserve the delicate structure of the material. Fill the defect without any pressure; do not overfill. It is very important to leave space between the grains to allow for bone colonization.

Does any clinical data exist on 4BONE BCH?

Over 500 in-vivo and in-vitro studies on HA/TCP are available. 4BONE BCH is a leading product among synthetic bioactive materials.

How should I use 4BONE BCH for the first time?

4BONE BCH granules are available either in a vial or syringe for better handling comfort, and in two convenient granule sizes: 0.5-1 mm and 1-2mm. For larger defects (>2.5 cc), 4BONE BCH large granules (1-2 mm) are recommended. The spaces between the granules optimize vascularization. For smaller defects (<2.5 cc), 4BONE BCH small granules (0.5-1 mm) are recommended. Sterile package opening: open the two blisters and remove the vial or syringe.

Vials: Dispense the contents of the vial into a sterile dish. Just before use, hydrate 4BONE BCH with sterile physiological saline to prevent osmotic shock. Alternatively, add fresh blood to the soaked granules before use. It is critical that 4BONE BCH is placed on healthy, fresh bone to maximize vascularization of the graft.

Syringe: Hydrate the contents of the syringe by aspirating the sterile physiological saline through the filter cap until liquid level is slightly higher than the granule level. Expel excess liquid by slightly pressing on the syringe plunger before use.

4BONE BCH can be mixed with autogenous bone to accelerate new bone formation. In large defects (>2.5 cc), it is recommended to mix 4BONE BCH with autogenous spongious bone (or bone marrow). This 4BONE BCH/autogenous bone mixture must be used immediately to preserve cell vitality.

4BONE™ RCM

Resorbable Collagen Membrane

4BONE RCM Collagen Membrane is a resorbable, cell occlusive barrier used in guided bone regeneration (GBR) and guided tissue regeneration (GTR) procedures.

BENEFITS

Effective

Predictable resorption time of 3-6 months for prolonged protection and function. Excellent handling properties and fully resorbable. Ensures a barrier effect for 3 months.

Easy to Use

Easily adapted and applied to surgical site. Optimal handling and high tensile strength for ease of placement and suturing.

Versatile

Either side may be placed against bone/tissue. May be used in dry or hydrated state.

Safe

Engineered from porcine collagen which has been successfully used in medical and dental procedures.

Material

Purified skin-sourced porcine collagen type I & III

Resorption Time

3-6 months

Indications

4BONE RCM biodegradable collagen membrane is intended for use during the process of guided bone regeneration (GBR) and guided tissue regeneration (GTR).

ORDERING INFORMATION

BR-C1525 - RCM 15x25mm
BR-C2030 - RCM 20x30mm
BR-C3040 - RCM 30x40mm

4BONE™ RCM

Resorbable Collagen Membrane

[1]Dept of Oral & Maxillofacial Surgery, School of Dentistry, University of Athens, Greece. [2]Dept of Dental Implants, Hygeia Hospital, Athens, Greece.

"BONDBONE® in Post-extraction Sockets: Clinical Application and Histomorphometric Evaluation - Preliminary Results"

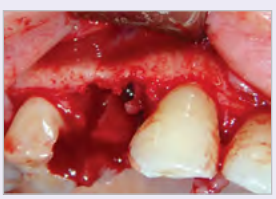
I.G. Gisakis[1], D. Kalyvas[1], K. Tosios[1], V. Petsinis[1], K. Alexandridis1, D. Zabaras[2], S. Bouboulis[2], A. Spanos[2], A. Kountouri[2]

ABSTRACT

Aim: The aim of this research study is to evaluate the quantity and quality of regenerated bone in post extraction sockets with guided bone regeneration methods for delayed implant placement, by clinical, histologic and histomorphometric criteria.

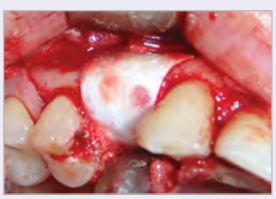
Materials and Methods: 32 adult patients, with no medical history, requiring an extraction and delayed implant placement were randomly selected to receive either extraction alone (EXT) or ridge preservation (RP). The patients were divided into four groups of 8 patients each. The materials used were: a) allograft with collagen resorbable membrane (4BONE RCM, MIS Implants Technologies Ltd, Bar Lev, Israel); (b) xenograft with collagen resorbable membrane; c) synthetic bone graft (BONDBONE®, MIS Implants Technologies Ltd, Bar Lev, Israel) with collagen resorbable membrane (4BONE RCM); d) no graft materials (control group). After a healing period of 3 to 6 months, bone core biopsies were collected from the augmented sites, and the healed sites of the control group, at the time of implant placement, by a trephine bur.

Clinical findings: Adequate bone volume was clinically observed in all cases. The width of the RP group decreased from 9.2 ±1.2mm to 8.0 ±1.4mm ($p<0.05$), while the width of the EXT group decreased from 9.1 ±1.0mm to 6.4 ±2.2mm

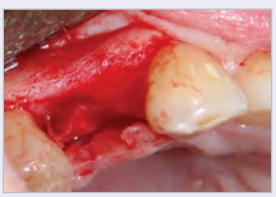


Clinical status after tooth extraction

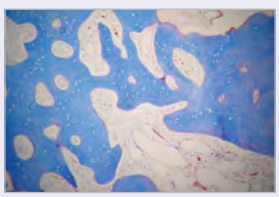
Application of BONDBONE®



Application of 4BONE RCM membrane



Clinical situation 3 months after surgery, at implant placement



Histologic picture

Female patient, 42 years old - GBR in post-extraction socket with BONDBONE® and 4BONE RCM membrane and delayed implant placement.

($p<0.05$), a difference of 1.6 mm. Both the EXT and RP groups lost ridge width, although an improved result was obtained in the RP group. No important post-surgical complications were observed. Minor complications such as early wound exposure occurred in 3 cases. All implants were restored into function, with a survival rate at baseline of 100%.

Histologic evaluation: The biopsies harvested from the grafted sites revealed formation and remodeling of trabecular bone, which was highly mineralized and well structured. Particles of the grafted material could be identified in all samples. New bone formation and connective tissues (CT) on and around graft particles was widespread. No inflammation or fibrous encapsulation was observed. The bone formed in the control sites was also well structured with a minor percentage of mineralized bone.

Conclusion: Ridge preservation using BONDBONE and 4BONE RCM collagen membrane improved ridge height and width dimensions when compared to extraction alone. The quantity of bone observed on histologic analysis was slightly lower in preservation sites, although these sites included both vital and non-vital bone. Overall, no serious complication was seen during the healing period. In most patients marginal mucosa and bone levels remained stable following restoration. Implant success rate was 100%.

4BONE™ RCM

Frequently Asked Questions

What is 4BONE RCM?

RCM is a resorbable dental barrier membrane made from porcine skin-sourced collagen, aimed for guided bone and tissue regeneration (GBR and GTR).

Why do we need to use a barrier membrane?

A barrier membrane is a device used in oral surgery and periodontal surgery to prevent epithelium, which regenerates relatively quickly, from growing into an area in which another, more slowly growing tissue type, such as bone, is desired. Such a method of preventing epithelial migration into a specific area is known as guided tissue regeneration (GTR).

Can we use only a barrier membrane without a bone graft substitute for bone regeneration procedures?

No. A bone graft substitute cannot be replaced by using only a barrier membrane. Bone graft substitutes have a different functionality in bone regeneration procedures.

How will I know which side of the membrane needs to be placed against bone/tissue?

4BONE RCM is versatile - either side may be placed against bone/tissue.

For how long does the membrane function as a barrier?

Thanks to a unique cross-linkage production technique, 4BONE RCM functions as an efficient barrier for 3 months.

Can 4BONE RCM be left exposed?

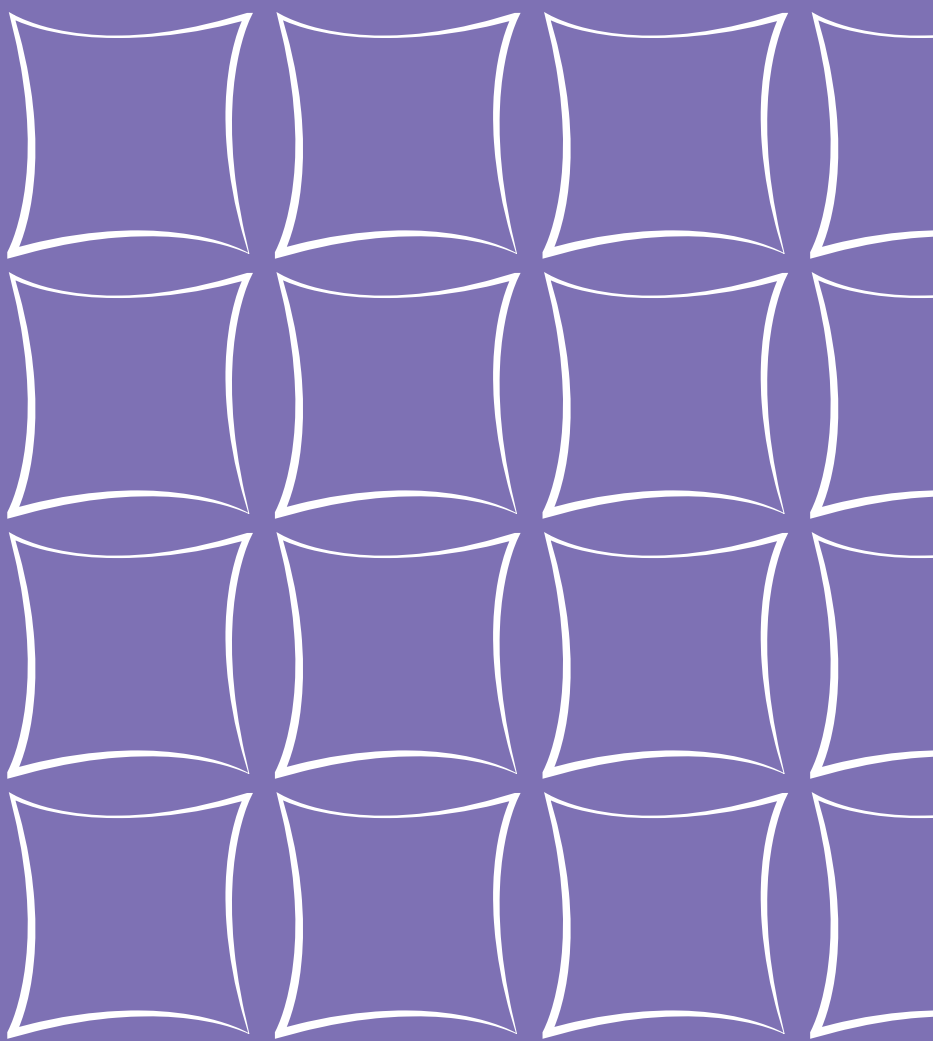
No. Avoid exposure of the membrane to the open air and the oral environment.

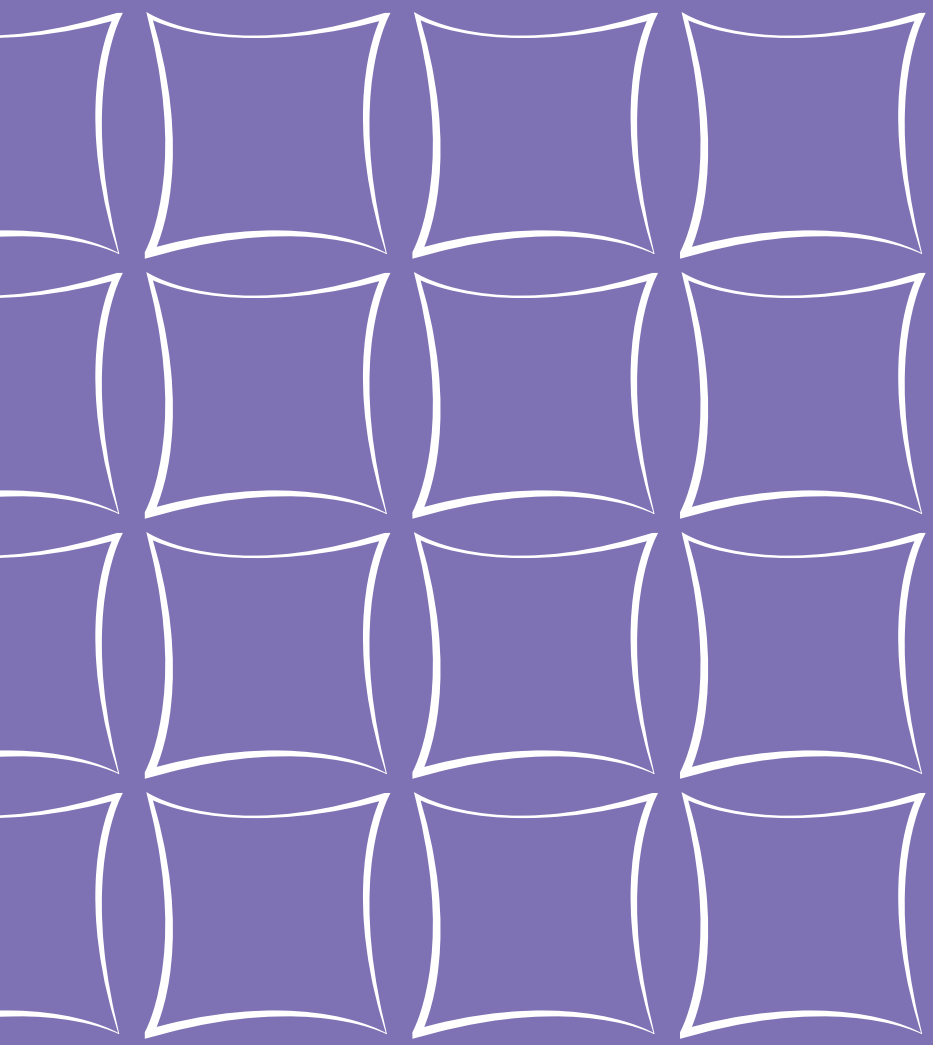
In which sizes is 4BONE RCM available?

4BONE RCM is available in three sizes: 15x25mm/20x30mm/30x40mm

Can the membrane be sutured or pinned?

Yes. 4BONE RCM is a very strong membrane that can be sutured or pinned. It's recommended to read the IFU prior to use in order to achieve the preferred outcome.





IT'S SIMPLE TO EXCEL
WHEN YOU HAVE
THE NEXT GENERATION

BONE REGENERATION AT WORK
MAKE IT SIMPLE

4MATRIX+ is a synthetic, fully resorbable bone graft putty, which promotes the ideal environment for bone growth, due to its fast and slow resorbing bone material mixture. Learn more about 4MATRIX+ and other MIS products by visiting: www.mis-implants.com

MIS® 4MATRIX+™